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POPULAR MECHANICS

An Illustrated Weekly Review of the Mechanical Press of the World

"Tells you how to do things." Written so you can understand it.

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Largest Sewer in the World

Great Artificial Underground River Being Built in Chicago

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BUILD AN UNDERGROUND RIVER IN CHICAGO.

Great Sewer to Help in Diverting Lake Michigan's Waters to Flow Through the Western Metropolis.

The largest sewer in the world is nearing completion in Chicago. It will be nearly 2½ miles long, 20 feet inside diameter and through it will pass the enormous flow of 900,000 gallons of water every minute The sewer, which will be known as the 39th street conduit, is but another artificial vein that Chicigo is to employ in transforming the great inland sea of Lake Michigan into a huge reservoir for the city's municipal and commercial needs. The waters of Lake Michigan, besides bearing the largest shipping tonnage in the world to and from the port of Chicago, supplying hundreds of manufacturing plants with water, and providing the city of 2,000,000 inhabitants with its drinking supply, are now released through divers channels to sweep the city clean of its foul sewage. In the accomplishment of the last named task engineering feats that have amazed the world have been performed. The building of the 39th street conduit is only one of them. The widening and deepening of the channel of the Chicago river and the construction of the Sanitary and Ship canal were the main tasks in turning loose the clear healthful lake water through the busy metropolis to wash away all unhealthful accumulations. The result of this work was to reverse the flow of the Chicago river and to afford a ship way from the great lakes to the Gulf of Mexico. The new conduit is to extend from the lake to the Sanitary Canal, emptying into the canal.

The building of the 39th street conduit is in keeping with the gigantic nature of the whole work. The conduit is to drain 12,000 acres of the city lying south of 21st street, the sewage of which section new empties into the lake polluting the city water supply. John P. Agnew, one of the most noted of American contractors, has been vested with entire charge in constructing the mammoth sewer. The cost will have amounted to nearly $2,000,000 by the time it is completed. Mr. Agnew was put in charge after numerous vexing delays. The contract was originally let in 1898 at a cost of $68 per lineal foot. The engineers found that half of the tunnel had to be dug from fine quicksand and half from mud. They soon had to abandon the task because of inability to do the work at such a low price. Then the contract was relet to Mr. Agnew at $118 per lineal foot, and the construction has progressed steadily since. The treacherous and deceptive nature of the quicksand and other obstacles encountered have necessarily made the work slow, but when it is completed the great sewer will be a blessing to the city. The entire length of the sewer, excepting 2,100 feet, is tunnel. Because of the quicksand the tunnel work had to be done with a shield 24 feet 10 inches in diameter and 14 feet long, propelled by hydraulic jacks, 5 inches in diameter. Water is used up to 6,000 pounds per square inch pressure. The jacks are set around the circumference of the shield and bear on oak tubing 8 inches thick. Inside the oak tubing are run five courses of brick masonry all laid in hydraulic cement. The cement is furnished by Meacham & Wright and is of the finest quality for tunnel work.

The shield is a steel ring with a sharp forward edge and is kept penetrating the earth several feet in advance of the diggers, all the time.

"Popular Mechanics is a review of the mechanical and engineering papers of the world and is written so you can understand it."—The Daily Telegraph.

New York, Chicago and Philadelphia, with populations of 3,437,000, 1,698,000 and 1,293,000 respectively, are the only cities on the American continent that have passed the million limit.

FREEZES CORPSES AND CREAM AT ONCE.

Remarkable Plant Where Ice Cream is Made and Corpses Kept On Ice.

A plant for the manufacture of ice cream for the table and the freezing of corpses for use in medical schools is one of the odd enterprises existing in Louisville, Ky. The place, which is on Eighth street, was supposedly only an ice cream factory, but it has just been discovered that there is in connection a cold storage plant used for the refrigeration of dead human bodies. The same pipes used in freezing cream for tables are made to keep the bodies cool. This corpse refrigerating annex to the ice cream factory is maintained by Louisville medical colleges. It has a capacity of about 100 corpses. The colleges are given the bodies by the state with the understanding that they are to be held 30 days for identification. They are obtained from penitentiaries, insane asylums, and other such institutions in Kentucky. About 50 corpses are usually kept on ice at a time.

MORGAN'S POWERS OF KINGLY MIGHT.

Influence in the Financial World Greater than the Rulers of Empires.

J. Pierpont Morgan is at the head of an industrial domain as great as an empire. In the financial world he wields more power than any king on any throne. A careful compilation of statistics to measure his immediate active power in the financial world, shows that the total capitalized power of Morgan is represented by $4,737,280,527—this aside from the influence which necessarily radiates out in all directions from so collossal a concentration of financial might. Morgan's influence is paramount on 55,555 miles of railroad (or over one-fourth of the total mileage of the country), capitalized at $3,002,949,571; he dominates the United States Steel Corporation, with a capitalization of $1,389,339,556, and three minor trusts, and is now in control of a steamship combination of a capital at the start of $170,000,000.

When Gladstone was informed that they had a man in America (William H. Vanderbilt) worth $200,000,000 in negotiable securities he declared that it was too great a power for one man to have, and that the government should look after him.

MAINE MERELY MAKES MINIMUM SPEED.

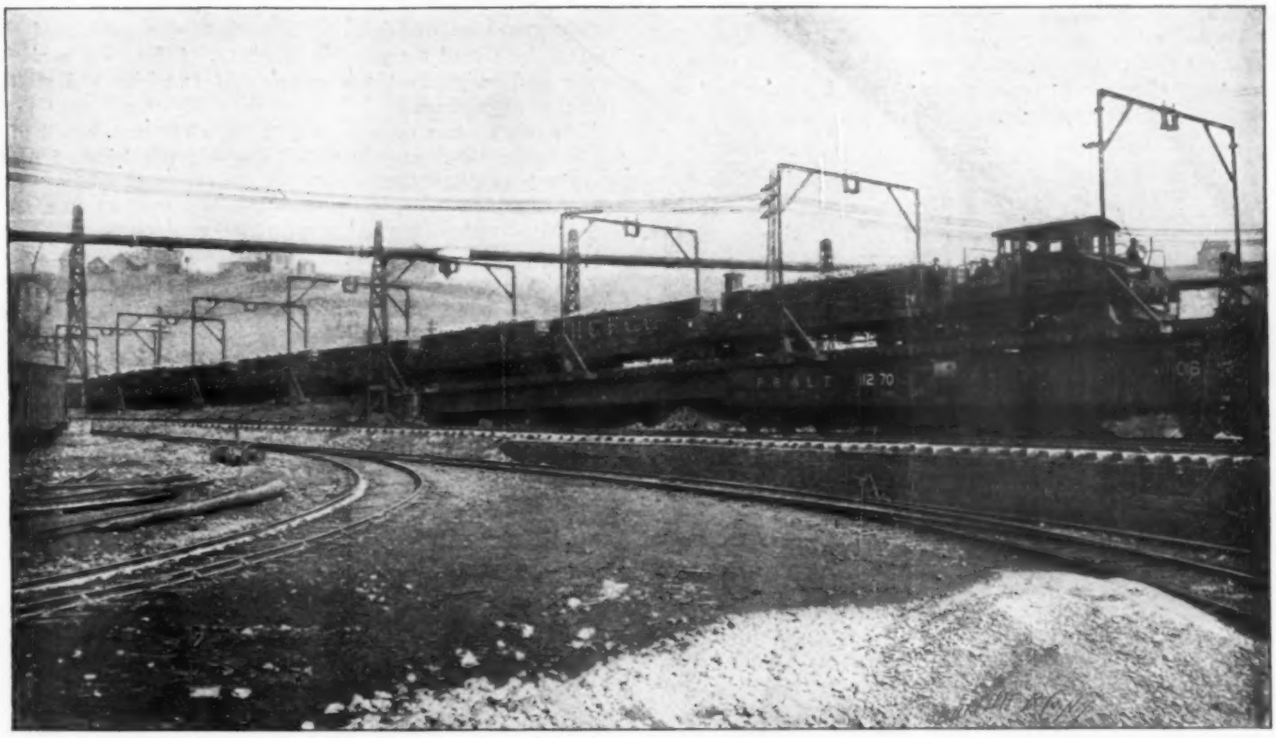
After Various Allowances, the Naval Board Decides the Ship Made the Required 18 Knots.

The report of the board of naval officers appointed to conduct the official speed trial of the new battleship Maine, shows that the vessel was barely able to make the minimum rate of speed demanded by the contract—18 miles per hour— and this was accorded only after making various kinds of allowances. Even after making tidal corrections the board found that the battleship had failed to develop the minimum speed, but by making other allowances for the claim that some of the stake boats used to mark the tidal course had drifted from their proper positions, it was finally decided by the board that the Maine had gone further than the total length of the course. This "re-correction of the corrections" resulted in the conclusion that the big boat had made just exactly 18 knots. Secretary Moody of the Navy will accept the vessel.

The Maine was built by the Cramps of Philadelphia. If the board had not been able to decide that the ship stood the test, it would have been rejected and the Cramps would have been forced to pay a penalty. The run was made over the trial course between Cape Ann, Mass., and Cape Porpoise, Maine.

There is more lumber in one average California redwood tree than in a whole acre of German forest.

Electric Locomotive Development--Part III.



The above illustration, the third in the series of Electric Locomotive Development, shows the heavy work being performed daily at the Carnegie steel works. There trains of 10 or more large cars loaded with coal, coke and iron ore are handled with one Westinghouse electric locomotive with greater convenience than could be done with a steam locomotive. In the illustration it will be seen the train is ascending a heavy grade. Current is taken from overhead wires.

INFECTION SPREAD BY HANDSHAKING.

Shaking hands is one of the most effective means of spreading contagion, according to J. M. Hirsch, Ph. D., of Chicago He says:

"The most delicate perfume upon the hand is neither a sign of freedom from germs nor a protection, and the most refined are not free from diseases of the lungs or throat, which are rapidly spread by touching the hand that has handled the handkerchief of one afflicted with a cold, catarrh or consumption. These diseases claim more than one-seventh of all the deaths. Our street cars carry signs requesting passengers to abstain from expectorating therein. These same passengers may hold their hands before their mouths when they cough and cover it with germs enough to infect a thousand people. They may use their handkerchiefs with the same result, and when we have an epidemic of the grip it is spread by the "grip of the hand" of a friend or a casual acquaintance or a mere stranger just introduced. People suffering from eczema usually don't like to inform everybody of their ailment, but go on shaking hands and distributing the disgusting disease with prodigal liberality. Persons coming from a house where diphtheria or scarlet fever prevails are very apt to carry these germs not only in their clothing, but more likely in their hands. The same may be said of any germ disease.

ALASKA RICHER IN COAL THAN IN GOLD.

The United States paid $7,000,000 to Russia for Alaska. For years afterward its barren frozen valleys lay idle. Now Alaska is one of the most lucrative possessions of the United States. Aside from the millions of dollars worth of gold that have been taken from its soil, it is to prove of wonderful value because of its coal deposits. South of Kenai two great coal fields have been found. It is believed that their value to the country will be double that of the gold fields. They are nearer the line of transpacific travel than any other fields, being only 20 miles from the northern steamer routes. They are nearer Japan, the Chinese ports, the Philippines and other coal hungry places of the far east than any other mines except those from which the wretched Japanese lignite is dug. Hawaii can be better supplied with coal for its sugar factories from Kenai than from Tacoma or Seattle. It is only a question of time when the Pacific will be girded with American coaling stations fed from American mines at either end of the trade route.

RAILROAD FROM CAPE TOWN TO CAIRO.

The great railroad now being built from Cape Town to Cairo is an achievement that may be compared with the Trans-Siberian road. It means that Africa shall not longer be known as the dark continent. The line already extends from Cape Town to Buluwayo, 1,500 miles. From here it will deflect to the west to penetrate rich coal beds, and will cross the Zambesi at Victoria Falls, which not long ago were regarded as one of Dr. Livingstone's well nigh inaccessible wonders. The plans of the late Cecil Rhodes that the road should connect Urganda with the Soudan have been abandoned under a late Belgian agreement by which it will pass through the rich Congo Free State to the upper waters of the Nile. The stretches yet to be built are from Buluwayo to Victoria Falls, 300 miles; Victoria Falls to Lake Kasali, 700 miles; from Stanley Falls on the Congo a railroad will be built to Mahagi on the Albert Nyanza, 480 miles which will occupy the missing link between the Cape and the Egyptian railway. No less than three eastern feeders are in waiting for the completion of the main line.

HOPI INDIAN BLANKET WEAVERS.

By Prof. George Wharton James, with Copyright Photographs by the Author.

I wonder how many people there are who ever think of the debt we owe to the savage for the steps he took in the art of weaving before our day upon the earth, and I wonder how many readers of Popular Mechanics will believe me when I assert

Hopi Indian Weaving a Blanket.

that there is not a single stitch used in our complex looms of today upon any kind of fabric that was not discovered and used by the North American aborigines a thousand years ago. We have improved in methods but not in weaves and every weave we have we owe to the Indians.

When the Spaniards discovered the Hopi Indians of Northern Arizona three hundred and fifty years ago, they were then wearing cotton garments of their own manufacture, beautifully and artistically woven. They grew the cotton themselves, as a few of them do to the present day.

Their neighbors, the Navajoes, are also great weavers, indeed they are better known for their wonderful blankets than are the Hopi; yet there is no doubt they learned the art from the Hopi. Yet, strange to say, among the Hopi the men weave the blankets, while with the Navajoes the women are almost invariably the weavers.

Take a look at the loom of the Hopi weaver at work when I photographed him! It is the crudest piece of machinery ever seen. Rude poles, with a supplementary yarn beam, suspended from above, a pole fastened to the floor holding the warp below and the supplementary yarn beam lashed with rawhide to the beam above; a stick for a shuttle; another flat stick for a batten; still another with loops attached for a shed, and the description is complete.

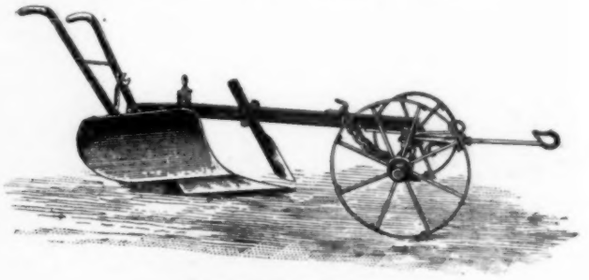
With fingers trained to dexterity by the practice of centuries the simple weaver, squatted on the floor before his primitive loom, goes to work. With no drafted or penciled pattern before him, with nothing but his own brain to guide his fingers through the mazes of the design he wishes to create in his textile, he threads the woof through the warp, fingering the latter as easily and surely as the harpist does the harp.

When a thread is in place it is battened down by the flat stick, one edge of which is somewhat sharpened, and thus thread by thread the garment is woven. Colors are used skilfully and harmonized and patterns of exquisite and striking design are produced.

The work when done is so firm and close that it will often hold water. This may be termed the primitive loom of American industry.

FEW AMERICAN PLOWS IN RUSSIA.

The American plow is quite unknown in Russia. There is no reason why this should be so. The superiority of the American steel soft-center plow is universally admitted. The shape of the moldboards is such that it turns the furrow completely over with the least friction, while the German plow, so popular in Russia, drops the furrow before it is turned entirely over and prevents the plow from running smoothly. The same is true, only to a greater extent, of the Russian plow.



Self-Guiding Russian Flow.

The usual definition of a plowman given in the dictionaries is "one who plows or holds and guides the plow." This definition could not hold good in Russia, because the man neither holds nor guides the plow; the plow guides itself. The German and Russian plows have a carriage which supports the beam and when once the plow is started it is not necessary to either hold or guide it. Every country has its own customs and the Russian farmer will not use a plow which does not guide itself. It ought not to be beyond American skill to put a heel on the American plow, to apply a pair of wheels on an axle and attach the same to the beam, thus to all intents and purposes giving this market what it desires. The Russian farmer likes two, three, four and even five share plows, because they do more work, requiring additional horse-power but no additional men.

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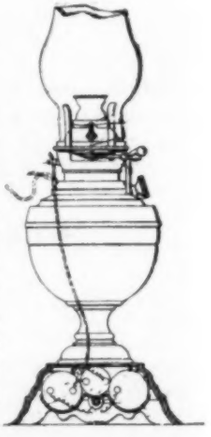
ELECTRIC LIGHTER FOR OIL LAMPS.



If you can't have electric lights in the house, the next best thing is an oil lamp lighted by electricity. A battery is placed in the base of the lamp and wires connect to two contact pieces which are placed one on each side of the wick. When you press a button the wick is raised and a large spark jumps from one point to the other and lights the wick. A cord can lead to any part of the room, and the button be placed at the end. It would be specially convenient for hall and other hanging lamps.

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SCHOONER WITH ENGINE DEFIES TUG TRUST.

Populace Mystified When the Craft With Sails Furled Moved Up the River.

Capt. J. Harvey of the Great Lakes schooner J. M. Harvey has set the tug trust at defiance by equipping his vessel with a gasoline engine and a propeller. Afterward when the vessel arrived in the South Chicago port it surprised the vesselmen and the crowds at the bridges by moving up the river to its dock without the assistance of a tug. The only thing that explained the mysterious movement of the craft whose sails were furled, was the regular exhaust of the gasoline engine and the eddy from the propeller.

Capt. Harvey said "I can handle the schooner better than a tug can handle itself, and the cost is almost nothing when you compare it with the tow bills we used to get. The engine, also, comes in handy out in the lake when there is a calm or head wind, and I would not be without it again.

After Capt. Harvey had decided to leave the South Chicago tugs alone and sail to his dock the harbor master refused to swing the bridge for him, and held the schooner four days. Capt. Harvey took the matter into the courts, with the result that he was paid $20 a day for the delay.

The motor was made from plans drawn by Capt. Harvey, and with its assistance he navigates the lakes with a good sized boy for a crew. The gasoline tank is on deck in the bow and in case of fire or collision the dangerous fluid will run overboard and avert an explosion. The engine is near the stern and is so arranged that it can be started and stopped from the deck. It develops 17 horse-power and drives a propeller wheel three feet in diameter. Under "steam" alone the schooner has logged seven miles an hour. When sails alone are used the shaft is disconnected and the wheel turns loosely in the wake of the boat.

St. Joseph, Mo., has the smallest birth rate and the smallest death rate of any city in the United States. It seems that people don't care to either die or be born there. The birth rate is 5.90 per thousand, and the death rate 6.40.

MOST SPLENDID OF AMERICAN RUINS.

Mission San Jose Is a Monument to the Architectural Skill of Our Forgotten History.

In the last issue of Popular Mechanics was told of the magnificent mechanical skill displayed in the ruins of the Cathedral of San Fernando, where Santa Anna, "the Napoleon of the West," established himself when he and his thousands came to wage war on the 130. In this chapter is presented the Mission San Jose, declared to be the finest ruin this side the water. Its fastidious carving and delicate device are regarded by modern architects as marvelous achievements. This splendid monument to a former American civilization was designed by Huica, an early Spanish architect. The entire facade, with its cherubs, saints and wreaths is said to have been brought from Spain to the city of Mexico. Thence it was taken over mountains, through forests and across rivers to its present site in Western Texas. San Jose is the largest of the early day missions and originally occupied many acres of ground. Large portions of the outlying fortifications still stand, though the rear walls of the main chapel have long since crumbled away. A study of the details of its decaying walls yet reveals many unexpected secrets of antiquarian lore. This, like the other missions, was built by the Franciscan monks.

Largest and Finest of American Ruins.

THE WORLD OF THE FUTURE

Here are some of the things of which the future may boast if the prediction of Nickola Tesla come true:

A system of wireless telegraphy by which a message can be sent clear around the world.

Electrical production of ozone for sterilizing water, to rid it of its many impurities.

The manufacture of artificial food by oxidized hydrogen.

The flying machine will be a fact. It will not bring universal peace, as some suppose. Some nation will rule the air as well as the sea.

Future developments will tend to diminish the number of individuals engaged in battle. This will bring into use a machine which can be operated by the fewest possible individuals.

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CONCERNING THE CARE OF THE EYES.

Toys and Story Books Bad for Children.—Foolish Prejudice Against Glasses.

By Frank Allport, M. D., Professor of Diseases of Eye and Ear, Northwestern University

The care of the eyes commences in early childhood, and an intelligent supervision by parents at this dependent period of life will go far toward insuring healthy eyes during the adult years. The attention of an infant should not be directed to objects held close to the face, and similar precautions should not be neglected as the child grows older, as it predisposes to short-sightedness and other evils. Children, therefore, should be discouraged from playing with small objects, toys, etc., and from poring over story and picture books. They should be encouraged to outdoor amusements and sports, where the eyes during these developing periods of life can have wide range and free scope, and where the general physical health and development may take precedence over ocular and intellectual labor.

Ordinarily there is a great indisposition among people to wear glasses, a prejudice born and fostered of pride and ignorance. Few prejudices are more foolish, for the proper adjustment of glasses to improperly focussing eyes is one of the greatest boons to humanity. Where glasses are needed they should be worn and a failure to do so means deterioration of ocular health and functions and usually produces much unnecessary suffering and inconvenience to the individual.

The English say Americans are only educated in commercialism. Wonder what commercial idea was signified in the Yale thesis entitled: "On the Action of Phenylhydrazine on Acythiocarbamic and Acylimidothio Carbonic Esters: Pyro-a B'-Diazole Derivatives. II. On the Action of Phenylhydrazine on Benzolypseudothioureas. 1, 5—Diphenyl—3—Amino—Pyro-a B' Diazole Derivatives."

UNIQUE GRAVE OF A PIONEER.

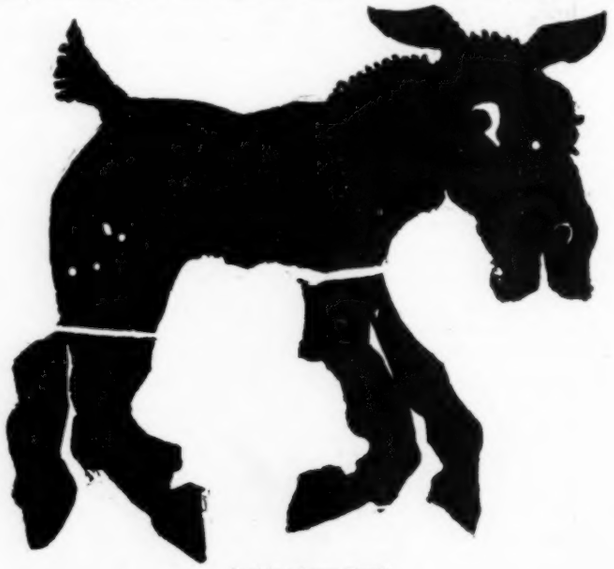
This, the most remarkable monument ever seen in any cemetery, marks the spot where lies the remains of the first white person born in Allen County, Ohio. The unique monument

McCluer Monument, Allen County, Ohio.

stands in the Ward cemetery and is in honor of the memory of Moses McCluer. It is entirely of Bedford stone, says the Adal (Ohio) Record, made to represent a pioneer's log cabin, even the traditional latch string appearing on the door.

CAN SOME ONE FIX THIS HORSE?

You wouldn't suppose that the three parts composing this ungainly-appearing beast could be cut out and re-arranged so as to be the likeness of a smart-looking trotting pony, yet such is a fact, according to the Harness Review. The three pieces com-



Trotting Pony Puzzle.

posing the picture should be cut out and re-arranged without folding. The answer, it is said, is perfectly satisfactory and the finder cannot fail to recognize it when the problem is solved. Millions of copies of this puzzle have been scattered throughout America, but very few have succeeded in working it. We would be glad to hear from the first of our readers who succeeds in obtaining the correct solution.

Easy Electrical Experiments

By L. P. Dickinson

HOW TO MAKE A RHEOSTAT.—PART II.

Having completed the wooden framework of the rheostat, we will next turn our attention to the coils of wire which are to make up the necessary resistance. Procure about 350 feet of No. 18 annealed iron wire. Take an iron rod ⅜ inch in diameter, and wind tightly and evenly upon it a coil of the iron wire, winding on enough to make a coil 5 inches long. Cut off the wire, leaving 3 inches projecting from each end. Remove the coil from the iron rod, and there will be found a spiral of wire, about ½ inch in diameter and 5 inches long. Make 32 such coils. The wire should be very soft, with a very little tendency to spring after being bent. If necessary, the coil may be heated by means of a spirit lamp while in position upon the iron rod.

Now fasten the end of one coil to the inside of the bottom

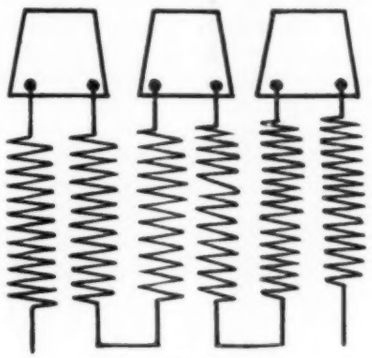


Fig. 1.

of the wooden framework, at a distance of 4 inches from the center, by means of a double pointed tack driven tightly into the wood. This tack should grip the wire close to the coil, so that the loose end of the wire may project from the rheostat, to make one terminal of the apparatus. Pass the other end of the coil upward through a small hole close to one of the copper sectors, and clamp the loose end of the wire under the screw of one section. The coil should be drawn tightly against the upper board, as this draws the spirals of the coil apart and prevents their touching each other.

At a distance of ⅝ inch from the first hole just bored, bore another, and through this pass the upper end of another coil of wire, securing it to the same sector of copper as the first coil. Fasten the lower end of this coil to the bottom board, in the same way as the first was fastened. However, when the third coil is put in place, the lower end of the second coil is firmly connected to the lower end of the third, by means of a double pointed tack, drawn firmly over the two wires. The upper end of the third coil is connected to the second copper sector, and the upper end of the spiral number four is connected to the same sector.

Proceed in this manner with the whole 32 coils, arranging them in a circle. When the lower end of coil 32 is fastened to the board, cut it off short, without connecting it to any other coil. A diagram showing the principle of the method of connection is given in Fig. 1. It will be seen that the upper point of junction of two coils is connected to a copper sector, while the lower connection of two coils is made by means of a double pointed tack. The coils should not touch each other, except at the ends.

The beginning of the first coil, which was left long, forms one terminal of the rheostat. The handle forms the other terminal. Accordingly, an insulated wire about 8 inches long is bared at the ends, and one end is bent around the bolt at the center, and firmly clamped between the lower nut and the upper board. A copper washer should be inserted between the wire and the board. The other end of this wire is left projecting from the rheostat, and is provided with a connector, as shown in the preceding chapter. This wire should be secured

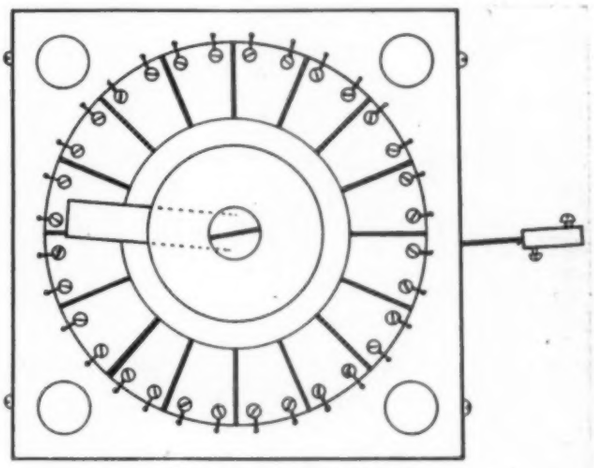


Fig. 2. Top View of Rheostat.

by a double pointed tack to the framework, but must not touch the coils on any account.

By turning the wooden knob more or less coils may be placed in circuit, thus varying the resistance between the two terminals.

Of course, wood is not a very safe material to use in such a piece of apparatus, because of the liability of the wires to overheat. But for an amateur who deals with small currents, the apparatus above described is very useful.

PACIFIC CABLE ON ITS WAY.

The submarine telegraph cable which is to join the United States and Hawaii as the first link in the system to the Philippines is on board the cable steamer Silvertown bound from London to San Francisco. On its arrival in December, the vessel will immediately begin laying the cable to Honolulu. The cable is wound around three enormous spools, each thirty feet in diameter. Its total length is 2,413 miles. The strands are one to three inches thick. The total weight of the cable is 10,000 tons. It will take the Silvertown two weeks to unwind her spools between San Francisco and Honolulu. The service will begin immediately thereafter. Two cable steamers, the Colon and the Anglia, will lay the line beyond Hawaii. The service to Honolulu will probably begin before the end of the present year and the entire project may be consummated before July 4.

THE HALLOWE'EN KNOCKER.

What means this startling, thumping sound
That falls athwart my ear?
Do spooks and spirits here abound
At this time of the year?

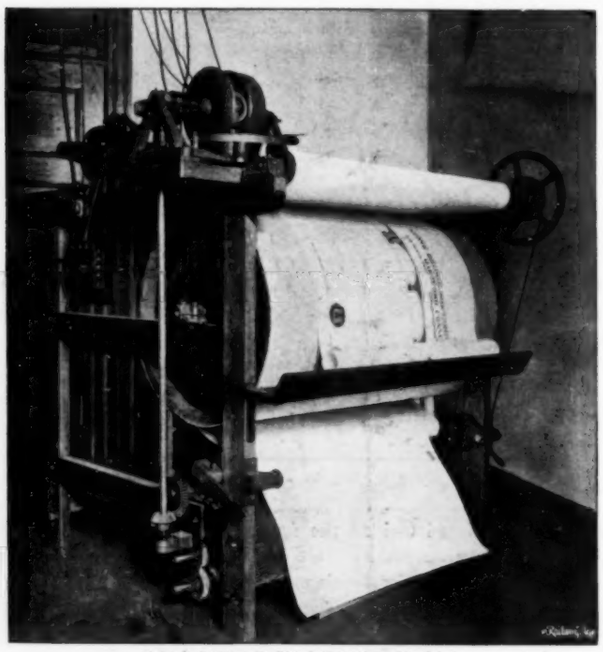
Nay, nay, those loud recurring blows
Come not from ghostly shocks;
For they, as every one here knows,
Are merely Johnnie's knocks!

Forest fires in this country burn up $50,000,000 worth of timber a year.

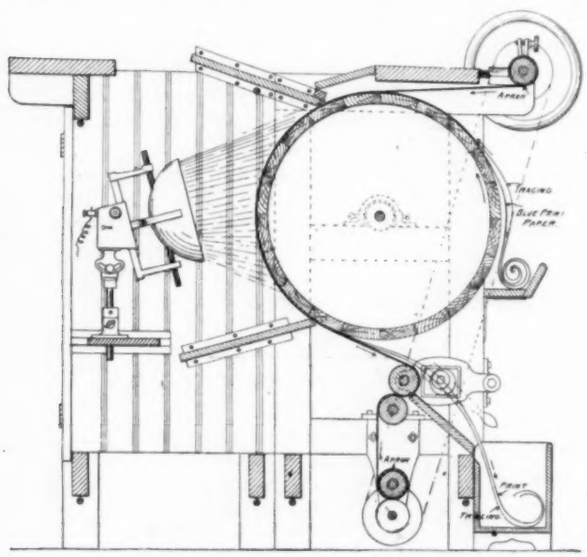
ELECTRIC BLUE-PRINTING MACHINE.

Apparatus Which Will Make a Blue Print 140 Feet in Length.

The modern engineer, architect, shipbuilder or machinist would not know how to proceed with his work without his blue prints. Millions of them are made each year and big establishments keep a large force constantly employed in making, sorting and filing them away for future reference. And yet it is only 20 years ago that the blue print was seldom found outside the largest establishments. Within the past few years rush orders of great magnitude made it necessary to put a large force of men at work, all making similar parts, and here the blue print came into wide use. Ten men operating ten machines, each making identically the same piece, and each piece so like all the others no one can distinguish them apart, means rapid work. For example: A machine shop receives a rush order for ten pieces of metal work. Each machinist must have his drawing to work from. To make ten drawings would often take longer than for one man to make ten pieces from the original plans. But with the blue print when the first drawing is approved, blue prints can be turned out by the dozens in short order, and as many men set at work, each with a copy of the same design, as there are machines on which to do the work.



Federal Electric Blue-Printing Machine.



Showing Principle of the Blue-Printing Machine.

Until recently blue prints were made one at a time by exposure to the sun. When the day was dark, no prints could be made. These prints were made by spreading a sheet of chemically prepared paper on a frame, laying the tracing cloth with the design drawn in ink upon the paper and covering with a sheet of glass. When the sun shone the dark ink lines of the tracing came out white in the print, the rest of the sheet turning blue. But in these days we must be independent of sun and weather and inventors have devised several machines for doing the work night or day and with speed. One of the most interesting is illustrated herewith, and is that made by the Spaulding Print Paper Co. of Boston. It consists of a drum revolving at any desired speed so as to give as long or short an exposure as required. An electric motor furnishes the power. A transparent belt is carried around the drum. The tracings and blue print paper are fed between the belt and the surface of the drum; the print paper feeding from a roll. As the drum revolves an intense electric light does the printing in about 20 seconds, and when the revolution is complete the tracing has been deposited in one box, the blue print cut off and dropped in another, and so the work goes on. With this machine it is possible to make a single continuous blue print 42 inches wide and 140 feet long, provided the tracing to print from was that size. A ¼ horse-power motor operates the machine, and about 100 amperes of current are used for the three to five lights.

GROWTH OF THE AMERICAN NAVY.

From 15 Wooden Vessels It Has Broadened to a Fleet Invincible.

One hundred years ago the American navy consisted of fifteen wooden warships, officered by nine captains, 36 lieutenants and 150 midshipmen. These ships were manned by crews that, with few exceptions, had seen no previous service on men-o'-war and carried experimental batteries, which the English sneered at as "monstrous and preposterous."

Today the tonnage of the American navy is the fourth greatest in the world, and the efficiency of its ships and personnel is probably the first.

The American Shipbuilder says: "Since the year 1800 the American navy has humiliated France on the ocean, suppressed the Barbary Corsairs, met England, the "mistress of the seas," on her own domain and defeated her in thirteen out of fifteen single-ship actions, destroyed piracy in the West Indies, opened the Orient to our commerce, beaten China, Japan, and Corea in various fights, aided the suppression of the slave trade, battered the fortifications of Mexico, driven the Confederate flag from the ocean, carried the flag far toward the pole, protected the growth of American maritime commerce and annihilated the fleets of Spain.

WORLD'S MOST IMPOSING BUILDING.

The editor of the Century, writing of the projected improvements at Washington, speaks of the capitol as "the most imposing structure of the modern world." He says:

To the devotee of art no new building can ever appeal with the poignant beauty of the ruin that crowns the Acropolis. The capitol at Washington is not in rivalry in our thoughts with the imperious associations of Athens and Rome, or with any of the creations of the ancient world or of the renaissance. We speak of it in comparison with the finest accomplishments of European art since the great days, in its power, by reason of its commanding position and of its own lines and masses to impress the minds of men.

THE POWER OF WAVES.

A person mechanically inclined cannot look on the waves that dash upon the shore of lake or ocean during a storm, without regret at the waste of power. But the power is so great and uncontrolable as to wreck any machine which attempts to harness it. Many efforts have been made, and fortunes spent in trying to utilize the quiet flow of the tides. The Engineer, of London, says the power to be derived is far less than supposed. The fall usually would be small and an immense area of water necessary to produce any power of value. A pound of coal used to advantage will lift 44 tons 10 feet. This represents the weight of water in a tank 10 feet square and 16 feet deep. A tank twice this size with a fall of 20 feet would only develop 1 horse-power for 6 hours.

Inventors have advocated the scheme of constructing vast basins or reservoirs, to be filled and emptied by the rise and fall of the tide, which will drive turbines or water-wheels. This, of course, is a refinement on the old tide mill. Several such mills have been built in England and on the Continent, but they are very feeble things, of a few horse-power. The available fall cannot but be small, and when the fall is small an immense quantity of water is needed if any useful amount of power is to be had. In practice 75 cubic feet of water falling 10 feet would be needed per minute to get a single horse-power. For 1,000 horse-power not less than 75,000 cubic feet per minute, or 5,400,000 cubic feet per tide, must be provided. A reservoir 500 feet long, 500 feet wide, and 20 feet deep, is an object of some magnitude. It must not be forgotten, however, that inasmuch as the whole fall of 20 feet would not be continuously available, a very much larger volume of water would be required.

SLAGS FOR HIGHWAY BALLAST

By Edwin C. Eckel, United States Geological Survey.

About 5,000 tons of blast furnace slag were sold in 1901 in the United States for use in constructing macadam highways and for railroad ballast. Sections of roads constructed in New Jersey with slag macadam, under State supervision, have proved entirely satisfactory. Slag has been used in highway construction to some extent near Buffalo, N. Y., to a greater extent in Pennsylvania and Alabama, and most extensively in the counties of Baltimore, Howard and Prince George, Maryland, where, under certain conditions, it has been found a highly satisfactory road material. In several States, notably in Alabama, slag is largely used as railroad ballast. Large quantities of slag are also used for reclaiming land and filling abandoned mine workings.

Blowing Out Wells with Air

Sand and Rust Removed by Novel and Interesting Method

Plate by The Half Tone Co., S. F.

"Cans, Bottles and Fence Posts Came Sailing Out on Top of the Water Spout."

Blowing out artesian wells with compressed air as a means of removing sand and knocking rust off the perforations has recently been attempted with peculiar and interesting results. Great geysers of sand and water were hurled high into space and often the roaring sounded like thunder during a violent storm. In blowing out the well shown in the accompanying illustration, large tin cans, bottles and a few fence posts came sailing out from the bowels of the earth on top of the water spout. They had been thrown into the well by mischievous boys or designing men. This well was 575 feet deep. In another bore exceedingly fine quicksand was encountered which caused the well to fill as fast as it could be blown out. It was learned later that a string of tools had been lost in this well and gun powder had been used in it and probably blown a hole in the bottom of the casing. It was either through this or through the perforations that the fine sand made its way into the well as fast as it could be taken out by the air lift.

The method employed in the work was to pump up a high pressure in the receiver and to discharge it through a small pipe put down. Pressures of from 300 to 450 pounds were pumped up in the receiver and discharged.

According to Power, Electricity and Gas, the experiments showed that for obtaining good results in cleaning wells by the air lift, the well should be capable of furnishing a sufficient supply of water to carry off the sand; that it is sometimes better not to use the discharge from the receiver but to pump the well steadily; a discharge from a receiver will cause a sudden diminution of pressure on the inside of the casing, should the casing be old and the water supply from the well small, this may be sufficiently violent to collapse the casing; that it is not always necessary to put the end of the air pipe at the bottom of the well.

"Are you the defendant?" asked a man in the court room, speaking to an old negro.

"No, boss," was the reply, "I ain't done nothing to be called names like that. I'se got a lawyer here who does the defensing."

"Then who are you?"

"I'se the gentleman who stole the chickens."

A WALKING MAGNET IN ILLINOIS.

Man to Whom Everything That Is of Steel Adheres Said to Possess a Remarkable Affliction.

Elisha Robinson, of Harper's Corner, Ill., is probably the most attractive man in the world, if the statements of the neighbors can be relied upon. He possesses such wonderful personal magnetism that he has everything coming his way. He has electrical powers that influence all about him and his "drawing" qualities are the talk of the community, where he is called the human magnet.

But these powers seem more alarming than pleasing to Robinson. In fact, he claims he is suffering from the most remarkable affliction that ever befell mortal man before, and he charges George Blandin, a wealthy resident of his home town with being responsible for his grief. He charges that Blandin has charged him so thoroughly with a charge of electricity that everything of steel charges at him wherever he goes, and a jury will be charged to determine as to whether Blandin shall pay the charge of $2,000 which is charged as damages for the charge inflicted on the man surcharged with electricity.

In his petition for damages Robinson declares that he is a veritable human battery, a walking magnet. He dares not enter a hardware store or a blacksmith shop for fear of creating pandemonium and causing himself to be pierced and hammered with knives, pitch-forks, hammers, tongs and other articles of iron or steel. He sat down to a dining table and things began coming his way so fast that Robinson had to flee for his life. All the knives and forks stuck to him and the guests were panic-striken. He first detected his remarkable predicament when he went to shave and the razor slapped against his face and stuck there, fortunately with the flat side against the skin, and Robinson had difficulty in pulling it loose without taking a part of his countenance with it.

Robinson claims to have sustained his affliction a short time ago during a storm. Some of the telephone wires were blown down and Robinson went to repair them. While he had hold of the wires Blandin went to make a call over a nearby telephone. It was one of the old-style telephones which had to be wound like a grindstone to signal central, and Blandin, it is charged, began to wind the crank as if he were grinding a hand organ to a rag-time air. As he did so, Robinson, who was holding the wire, felt the electrical streams ooze through his body; he was unable to let go of the wires and Blandin kept on grinding. The subtle fluid continued to run riot through his system, and when he finally stopped turning the crank Robinson was wound up like a Kansas grasshopper. He finally managed to straighten himself out but the electricity remains in him, he claims, and his life as a result, is in constant peril.

Robinson claims that every time he sits down to the table he becomes the target for a flying mass of cutlery. This not only puts him to much discomfort, but delays operations on the rest of the boarders, so that all have demanded that he find another eating house. He declares that the nails in the fences draw out as he passes by.

The people in Harper's Corner are thoroughly frightened. They say that Robinson is the first victim of this electrical age and they view with alarm the prospects of the new kind of ailments that may infect the human race in the future.

LIKE EUROPE'S GREAT DEPOTS.

A suggestion of the high class railroad depot that is such a delight to travelers in Europe will pervade the Transportation building at the St. Louis World's Fair. The accompanying illustration shows the building as it will appear when completed. It will cover fifteen acres of ground and will be one of the most magnificant edifices of the exposition. Within will be shown transportation of every conceivable kind from the earliest days of man to the present time. Through the magnificent archways fourteen permanent railroad tracks will be laid from one end of the building to the other. Willard J. Smith, Chicago, is chief of this department.

Transportation Building.

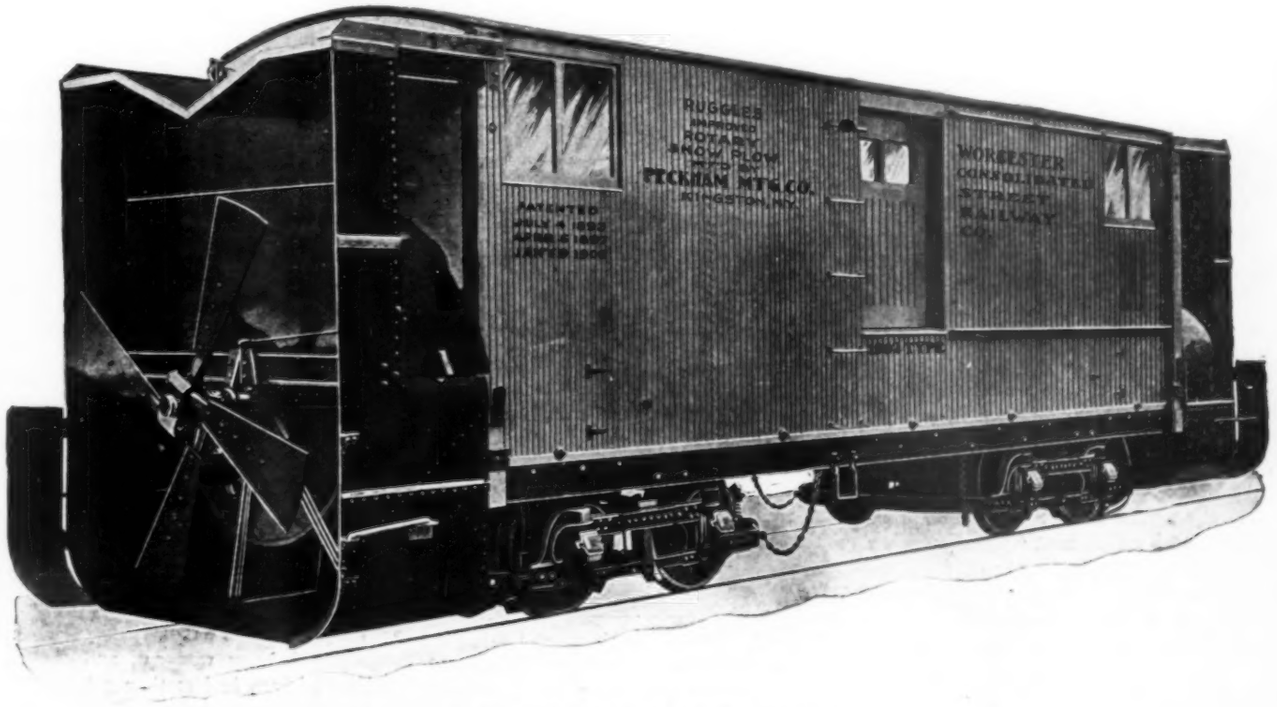
A new road material is being tried in England. Blast furnace slag while hot is mixed with coal tar. When laid it forms a dustless, mudless street, hard as stone and smooth.

The better class of mechanics nearly all read Popular Mechanics, and many other people like it.

ELECTRIC ROTARY SNOW PLOW.

All through the north, in the repair shops of every electric railway, both city and interurban, men have been busy for two weeks past, getting the snow fighting machines in readiness for winter. The rule is to be prepared in ample time, for a sudden fall of heavy snow might block all the lines within an hour, and every hour a street railway is out of service the company is losing hundreds of dollars which it otherwise would have earned.

On the city lines machines equipped with revolving brooms and scrapers are most generally used,but out on the country lines through a drift 5 feet high and 300 feet long at a speed of 20 miles an hour, and come out without delay or slowing down, and there are records of cuttings made through drifts 12 feet high. One man and a boy are sufficient to operate the machine which is controlled in the same manner as the ordinary electric street car.



Machine for Clearing Snow from Electric Lines.

entirely different equipment is required. Here the tracks are exposed to the sweep of the wind as it comes across prairies for miles, and great drifts pack several feet high and often hundreds of feet long. The constant approach of the country electric line, to the steam road, is illustrated in its snow fighting outfit. Snow plows of the same type, as are used on steam roads, only smaller, are now found on these electric lines. Now the rotary plow, the greatest snow devourer ever devised, is being used, propelled of course by electric motors while other powerful electric motors turn the bevelled steel blades of the great wheel which revolves very fast, and burrows through the drifts. The snow thus cut loose is drawn up by fans and blown out a considerable distance on one side of the track. The plow has rotaries at each end and will work in either direction. Ice diggers and steel track scrapers remove all ice and sleet from the rail leaving it perfectly clean. The machine will go

SIMPLE MINERAL LOCATOR.

A pointed steel rod suspended from a string serves as a metal locator which has proven of wonderful value to its inventor, William McGuire, of Carthage, Mo., according to the Carthage Press. The steel is made from a gun barrel and is but four inches long. The bottom is filed to a point the size of a slate pencil and a slit is made in the point. In this slit is fastened a small piece of the mineral or metal of the same nature as that McGuire expects to locate. To the top of the steel rod is fastened a ring to which is attached an ordinary cord. When McGuire fastened a $5 gold piece in the slit and let the indicator hang near a gold watch the rod began to swing like a pendulum toward the watch. He fastened a piece of lead in it and let it hang near a chunk of zinc. The rod swung toward the zinc. With this device McGuire claims to have located the big strike on the Fenner track and several others, including several on the Payne and Davison lease.

An asphalt conduit for buried wires which can be bent to turn corners, when warmed, has been invented by the Howard Conduit Co., Manchester, England.

THE "PERPETUAL LIGHT."

Remarkable Beacon That Guides the Mariner on the Lower Mississippi.

Down in the Louisiana swamps, in a lonely, desolated spot where human feet rarely ever tread, is a light that is the wonder of mariners. It is called the "Perpetual Light," for as long as the oldest riverman can remember it has shined every night and day. It is situated in the water area between Lake Borgne and Mississippi sound, a little south of Chinchuba. It stands away out in the marsh, but can be seen from the Louisville & Nashville railroad. The light flickers away steadily all the time for the benefit of the mariners who frequent these waters. It is the one bright thing in this dismal stretch of country. Sea weeds grow wild and rank around it. The land about is a flat and treeless waste, overhung by miasmatic mist and a perfect prairie of wild and matted weeds alive with poisonous reptiles. This land, threaded by sluggish arms of water, is visited by a human being just four times a year. Once every three months a man makes his way to the lonely light and fills it with oil, trims the wick and fixes it in condition to burn three months longer. It is situated so the winds cannot put it out. It never explodes, never gets dimmer or brighter but burns with the same steady power all the time.

South Africa has placed an order with a United States firm for 18,000 eight-horse plows.

SHOP NOTES

MAKE YOUR ROOM COMFORTABLE.

The long winter evenings are nearly here, and the workman who has the mind to improve his time by reading or study several evenings in the week, will come out next spring a better informed man for the effort. One of the most necessary things is a good light; another not necessary, but desirable, is a neat and convenient case to hold his books. The Metal Worker, October 11, tells how to have both:

An Ideal Reading Room Outfit.

To make a wall light which will bring the lamp down where you want it, and yet leave the table or desk clear for drawing or writing, take a piece of ⅛-in. brass tube bent as shone and of a length suitable for the location. Should the brass tube prove too hard to bend without breaking it may be annealed by heating evenly over a charcoal or gas fire and plunging in cold water. Both ends should be threaded. On the lower end may be screwed an ornamental brass elbow taken from the outer end of a discarded gas bracket, and on the upper end may be screwed an ordinary burner pillar. Into the small end of the brass pillar may be soldered the lower end of a brass stork neck connection, such as is used with a table gas lamp. Each of the joints should be sweated with solder for additional security. The solder and other roughnesses may be filed away and the work may then be polished and lacquered. Any kind of a gas burner—but preferably a Welshbach—may be attached at the lower end, and the upper end may be slipped over the gas burner of any wall bracket or chandelier. An eye shade should be used to protect the eyes from the glare of the strong light

An open book shelf to hold the books and papers to which frequent reference is made is a convenience which cannot be entirely displaced by the more pretentious and aristocratic book case. At the expense of a few gas fittings and some odd ends of pipe such a shelf as shown in Fig. 2 may be made.

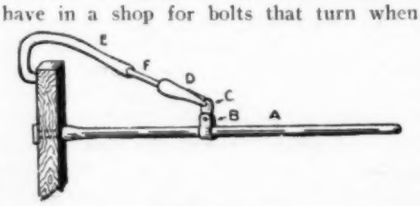
Two parallelograms of ¼ or ⅜ inch pipe are made and put together by means of a long and short thread on the middle and bottom braces. The three boards for the shelf are ½-inch popular cut 7 inches wide and about 2 feet and 8 inches long. Holes are bored in each corner of two of the boards, of a size to allow the pipe to slip easily in the holes, and about 2 inches from each end, as shown in Fig. 3. The upright pipes of the frames are slipped into the holes before screwing the frames together. The top board may have a neat molding mitered around the edges and holes bored through it at the points where the hanging wires pass through it to be fastened around the pipe frame. Heavy picture wire may be used to hang the shelves from hooks driven in the wall, or from picture hooks hung from the ordinary picture molding.

CEMENT FOR LEATHER BELT.

A good cement for leather belting is made by working together ten parts of bisulphide of carbon, one part oil of turpentine with gutta percha, forming a thick paste. The leather where the cement is to go should be unrolled and roughed, and when the cement is put on the ends should be pressed together closely till the cement has well dried.

A HANDY BOLT HOLDER.

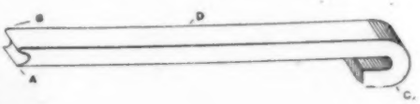
The accompanying figure shows a bolt holder that I have made and am using, which is as handy a tool as a smith can have in a shop for bolts that turn when you tighten up the nut, says A. T. Wright in the American Blacksmith. A is the rod, ⅝ inch round, tipped with steel and one end checked or roughened. This end works on the head of the bolt. B is the clip that works round and up and down on the rod. C is a catch that works in clip, the inner end of the catch being toothed to take hold of the rod. Hook F and ring D makes a swivel. E is a hook that hooks under the wagon axle or felloe beam or anything that comes handy. This device also makes a good tire-bolt clamp.



Useful Bolt Clamp.

CUTTING KEYWAY WITHOUT REMOVING FLYWHEEL.

A correspondent tells in the Engineer how he cut a keyway in a shaft without removing the flywheel, which was constantly working loose. There were two keyways in the hub of the wheel, but only one in the shaft; to remove the wheel was a difficult task. A tool was made of steel, about 14 inches long, ⅝ inch thick, and 1⅛ inch wide at the cutting edge A. The edge B projected a little way beyond A and was rounded so that it would not cut the hub of the flywheel. The end c was rounded over to enable the tool to be withdrawn from the hole. The keyway was started in the shaft with a flat chisel and this tool then put in. Shims were placed on the top of the tool at D, so that the first cut would be about 1-64 inch deep in



the shaft. The tool was driven through the hub by striking on the end c. After each cut the tool was withdrawn and another shim added at D until the required depth of keyway was obtained. By this means the keyway was cut, and the key fitted and driven in less than 5 hours.

REFRIGERATION IN PLOW MAKING

Wherever you find a modern plow factory you also find a refrigerating machine, says Ice and Refrigeration. After the various pieces of the plow proper have been shaped they are placed in a steel oven, upon a revolving table or floor, where in a very short time they are heated to a dark red color. They are then taken out and first laid upon a bench and tapped with a hammer in order to remove any flakes of loose metal or other foreign substance that might adhere. Next they are seized with a peculiarly shaped grapple and lowered into a tank of cold brine, where they are chilled or tempered in an instant. To keep this brine at the required temperature the tank is provided with expansion coils connected with a refrigreating plant, or else the brine is pumped over the ammonia coils placed near the tank and the brine kept in rapid and constant circulation.

THE BEST CROWN SHEET.

A correspondent writes to Science and Industry asking the following: Which is best in a drop-flue marine boiler, a high or low crown sheet for burning hard coal? Which is best for burning soft coal? The answer is: With dry anthracite coal, since it burns without much flame, either a high or a low crown sheet will answer equally as well. The impression that hard coal requires a low crown sheet for greatest economy is erroneous, because all the heat that is generated must be utilized either by the boiler in making steam, or by the chimney in producing draft. With bituminous coal, the case is wholly different and there is a great loss if attempt is made to burn it in a furnace having a low crown sheet. The hydrocarbon gases, which are driven off by the heat, burn with a long flame, and if this flame impinges on the boiler plates, before combustion is complete, the gases are cooled below the point of ignition and escape up the chimney unconsumed. Experiment shows that the temperature of ignition of the gases of distillation of soft coal is approximately 1,200 degrees F., while the temperature of the furnace plates on the fire side is only about 500 degrees F. That loss of fuel is caused by the flame striking the cooler iron, may be very readily tested by holding an iron bar in the flame of an ordinary gas jet and noting the immediate production of smoke.

NOVEL METHOD OF CLIMBING TALL STACKS.

Recently the steel smokestack of the electric light plant at Canton, Pa., 100 feet high, needed painting. The fireman made a sort of kite or parachute which snugly fitted inside the stack. He attached a string to the parachute; the draft in the stack carried it and the string with it up through the stack and out, the parachute coming down outside the stack. A small rope was next tied to the string and pulled up, and finally a rope strong enough to hold a man. Then tackle was arranged to haul up a man to do the painting.

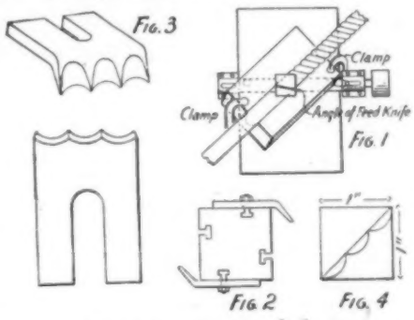
MAKING ROPE MOULDING ON STICKER.

A correspondent in the Wood Worker describes how he makes rope moulding on a sticker.

We must have a round stick to begin with. In our mill the only way to get such a stick is to turn it in the hand lathe or run it through the sticker. After getting the "rounds" ready, take a block of wood and cut a half-round groove in it large enough to fit the stick to be worked. This block is placed on a slant across the machine, as shown in Fig. 1, and a hole cut through that will permit the cutters to swing freely.

I now fasten a block to the under side of pressure foot, into which is fastened a piece of file sharpened on one edge. This piece of file must have a slant across the stick at such an angle that it will feed the stock properly and hold it down at the same time.

The knife I use is bent forward just outside the head—see Fig. 2. This makes it possible to grind the knife so there will be no scrape at all—so that it just clears the cut. The sharpening is done from the under side. In order to make the strands of the rope look alike the middle bead



Making Rope Molding on Sticker.

must be ground a little lower than the two outside ones. It will be noticed that the stick crosses the head at an angle. Now if the beads all swung the same diameter the two outside ones would not be cut as deep as the middle one, because the middle one is cut when the knife reaches its highest point, the side ones being cut a little before it reaches this point and the other after it has passed it.

It is very important that this knife be so ground that the center of the bead will be cut first, as shown in Fig. 3. If so ground it will cut smoothly until dull enough to burn the wood. The feed knife must be arranged in such position that its cut will come directly between two beads, for it is necessary to have it cut in nearly ⅛-inch. It will be noticed this knife cuts three beads at a time and one turn of the stick finishes it as far as it moves up.

In order to find the proper width of beads—supposing, for instance, we want to make inch rope—the distance across the corners of a stick an inch square will be the proper width of knife for the three beads—see Fig. 4.

WHY MERCURY IS USED IN THERMOMETERS.

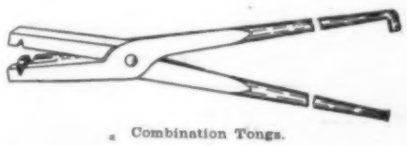
The reason why mercury is used in thermometers is because of all liquids it most nearly fills the conditions of returning accurately to the same volume upon being brought to its initial temperature, and of admitting a considerable change of temperature without a change of state. Moreover, it is easily obtained, is very opaque, and hence easily seen, and does not cling to the glass. Alcohol and ether are occasionally employed for moderate and for low temperatures where mercury freezes.

EBONY, THE WOOD OF KINGS.

While many of the hardwoods in use at the present day are of comparatively recent introduction, ebony was known and highly esteemed by a number of ancient races, and used by them for kingly and other purposes. Within the past few years, its use with the growth of wealth and luxury has increased in a remarkable degree and in France particularly the manufacture of articles from ebony has attained a high degree of perfection. For toilet articles and boxes, in combination with silver, the wood is most effective; the dead black of the wood and the brilliant white of the silver affording a striking contrast. While the name ebony is given to the wood of several varieties of trees, all kinds are of great density and dark color; the heaviest varieties being, as a rule, also the darkest. There are three varieties of ebony well known in the trade. The ebony from the Gaboon coast of Africa is the darkest. The Madagascar ebony is the densest. The Macassar ebony furnishes the largest pieces. London is still the chief mart for this wood, and from there it is shipped to the various countries in which it is used for manufacturing purposes.

USEFUL COMBINATION TONGS.

A useful pair of combination tongs which any smith can easily make is illustrated in the American Blacksmith. The designer says: The tool shown I find of use as a pair of tongs, clip tie and bolt head holder, both at the fire and at the vise. The jaws have a half round swage crease sunk on the inside of each. About ⅛ inch from the outer end of each, I sink



Combination Tongs.

a transverse or cross crease suitable for receiving the edge of the head of a bolt. As it is deeper in the center than on either edge, it holds a short bolt firmly in the fire or in the vise when welding, cutting threads, taking off nuts, or running down nuts on plow bolts or carriage bolts. This is done without damage to the heads. The ends of these tong handles are made, one hooked, the other flat, straight and fitting inside the hook of the other handle. This forms a clip tie. Such tongs will be found a combination which will save a blacksmith many steps during a day's work looking for the tools which it combines. It will also hold flat and round iron.

Twenty oil carrying steamers with a capacity of 600,000 barrels, will soon go into service between New York and Texas.

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HOW TO BURN SOFT COAL IN A HOUSE FURNACE.

The great strike lasting five months seems settled and the miners are returning to work.

The mines have been closed so long and the supplies in hand so exhausted, that it will be a physical impossibility to either dig enough or get cars to haul the coal when dug, to supply the entire country for probably two or three months. This means that consumers will have to get their hard coal on the installment plan, a ton at a time, and points distant from the mines will be late in getting any. In the meantime cold weather will have come, and people who have turned up their nose at soft coal will be mighty thankful to use it now.

Those who have never burned soft coal in a furnace will be interested in the advice of a correspondent of the Metal Worker, who says: I have used bituminous coal for ten years in furnace, and I would not trade 1 ton of soft coal for 1½ tons of hard coal. I can get more heat out of a ton of soft coal, and it goes further than a ton of hard coal by two weeks in cold weather and three in moderate weather. I pay $2.75 per ton for it here, as it is mined but 12 miles dintant. It is very soft, clogs up when it gets hot, so I have to go in at the top of the fire with a large poker and stir it up when I wish to get a red hot fire, but if I wish to get a steady, even heat I let it alone and it soon burns up. In regard to attending to it, I start my fire just the same as I would if I burned hard coal, and when I get a good fire I fill up the fire pot and run it precisely as if it were hard coal, with the exception that it requires more draft. If the damper is closed too much it will smoke, and on the other hand if you give it too much draft it will make too much heat. Those who run a furnace and burn hard coal must learn how much draft it requires and govern the heater accordingly, and also in accordance with the strength of the draft in the chimney the same things hold good as to soft coal. I advise a deep fire always, as it can be controlled more easily than a shallow one. I never let my fire go out after I start it in the fall, and have banked it and kept it for a week and not touched it. Then I took a poker and went into the top of it and broke it up and shook out the ashes, giving it plenty of draft and in less than an hour had a good fire. When breaking up the coal on the top of the fire it is best to open it up most at the back. To hold my fire over night I put on a bucket of coal and open the small wheel in the feed door and close or raise the dampers, with the exception of the one in the stove pipe, and that I leave open about a quarter of an inch. In the morning I take my poker and break it up on the top, then shake down, open the dampers and put on a scuttle of coal, if it needs it, although my fire almost runs until noon with the amount of coal mentioned, when I go through the same process again. If you let air in above the fire it holds it down and it will not heat so hard. With regard to cleaning, I clean my smoke pipe once a month, that is all. I do not take the furnace down. I think I have not had it down in ten years. I have run my furnace ten years with bituminous coal and my grate is as straight as the first day it ever had fire in it.

ALL SERENE.

Glimpses bright and golden
In all the woods around,
And the rosy apples fallin'
And a-dentin' of the ground.

And what care we for money—
For dollars in bright ranks?
Our credit's good, my honey,
At the Sweet Potato banks!

—Atlanta Constitution.

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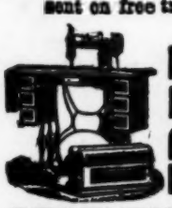

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EVERYBODY CAN TRY THIS HEATER.

Mr. T. H. Appleby, Syracuse, N. Y., writes: "I would like to suggest to readers of Popular Mechanics, a simple way to defy the cold weather and coal strike. By half filling a common wash boiler with water and heating it on an oil or gas stove, when hot the smallest blaze will keep it so. The cover must be kept on the boiler. In this way a large room can be heated very comfortably with a small fraction of the cost of coal or wood.

THE TRUTHFUL TEXAN.

The following is a reduced reproduction of the letter-head on which one of our readers wrote us the other day.

OFFICE OF
S. LEMLY,
PILL ROLLER.
Sells Bad Medicine, Fine Stay-Shun-Ary, Books.
All Kinds of Seed That Will Sprout.

Yazoolana Jones, 10 - 9, 1902

AMERICA IN SOUTH AFRICA.

The British trade journals continue to comment on American enterprise in South Africa and the extent to which American machinery dominates the market. The Engineer says: "American firms are completely supplanting the English firms at Cape Town, chiefly by carrying a large stock and making quick delivery."

To remove a cinder from the eye take a long horse hair, make a small loop, pull the lid out and insert it under the eyelid. Then draw the lid down and remove the loop, when the cinder will be removed, unless so deeply imbedded as to require the services of a doctor.

The first tannery in the United States was built at Lynn, Mass., in 1629.

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S'POSE FISH DON'T BITE AT FUST.

S'pose the fish don't bite at fust;
What be you goin' to do?
Chuck down your pole, throw out your bait
An' say your fishin's threw?
Uv course you hain't; you're goin' to fish,
An' fish, an' fish, an' wait
Until you've ketched your basket full,
An' used up all your bait.

S'pose success don't come at fust;
What be you goin' to dew?
Throw up the sponge and kick yourself,
An' go to feelin' blue?
Uv course you hain't; you've got to fish,
An' bait, an' bait ag'in.
Bimeby success will bite your hook,
An' you will pull him in.

—Houston Post.

SELF-REPLACING TROLLEY WHEEL.

The cut shows a trolley wheel, a recent invention, with spiral grooves which lead to the main central groove. When the

Self Replacing Trolley.

trolley tries to jump the wire and plunge the car in darkness, this trolley will quickly wind itself back where it belongs. It will doubtless be more popular with chaperones than anybody else.

HOW THEY SUMMERED.

"Where did you spend the summer?" asked the front row chorus girl.

"I toured Switzerland in an auto," said the little girl with the saucy kick.

"I took the waters at Aix-les-Bains," said the girl with the diamond buckles on her slippers.

"I summered at Newport," said the dreamy blonde in the pink slippers.

"I studied Shakespeare while in the White Mountains," said the auburn-haired one who led the grand marches.

"I worried with my modiste in dear Paree," gurgled the girl who never could catch step.

"And what did you do this summer?" they all asked of the first chorus girl.

"I?" she murmured. "Oh, I washed dishes, too."—Judge.

A Des Moines man has invented a throttle for gasoline engines which works the same as the throttle on a steam engine.

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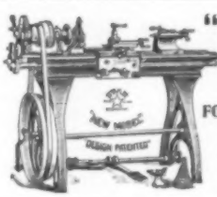
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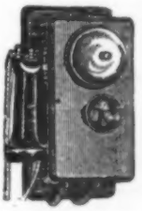
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FOR SALE—Only steam laundry in town; two railroads; rent cheap. New machinery and good place for agency work. Steam Laundry, Chatsworth, Ill.

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FOR SALE.

SALE OR EXCHANGE—$850 Baldwin Steam Carriage, practically new, $400; Duryea Gasoline Carriage, cost $1,000, fine shape, $425; Motor Cycle, like new, $85, cost $150; 6-h. p. Double Cylinder Carriage Motor, $125; $350 Motor Tricycle, $175; 7-h. p. Stationary Steam Engine, $40; Lock Regulator, $4; Cycle Motor, $20; 17 in. Iron Bed Wood Lathe, $50; Good Shaper, $85; 8 in. Universal and Indant. Comb Lathe Chuck, $6; ½ in. Drill Chuck, $3.50; 3-h. p. Motor Casting, $20; 1¼-h. p. Cycle Motor Casting, $9; Fine Set Tinner's Tools, cheap; Fine Complete Nickle Plating Plant, cheap. Buy, sell or exchange for Stationary Engines, Autos, Motor Cycles or Motor. T. S. Culp, Canton, Ohio.

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EXCHANGE—Stereoptican with 90 views to exchange for Motor Bicycle or 2-Day Marine Chronometer. G. W. Casteel, Texarkana, Ark.

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